# USE OF PICLORAM TO OBTAIN ROOTKILL OF WOODY PLANTS IN PRACTICABLE RIGHTOFWAY VEGETATION MANAGEMENT, 1985*

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Key words: Rootkill, picloram, rights-of-way, vegetation management, Connecticut.

This is the fourth Annual Progress Report on the use of picloram (Phytologia 55(6):361-364, VI 1984; 56(5):365-367, XII 1984; 57(3):177-181, V 1985 -- q.v. for detailed methods et al.) for effecting rootkill of woody plants considered desirable or undesirable in practicable R/W Vegetation Management in the north-eastern United States.

HISTORY, PROCEDURE AND RESULTS. The work is done on 25 acres of herbicide-induced essentially stable Herblands and Shrublands (managed since 1926, with herbicides since 1946, with picloram pellets since 1978, with liquid picloram since 1980) of 1100-acre Aton Forest in the Beech-Birch-Maple-Hemlock Zone of New England, plus 1.3 miles of utility-line-covered roadside (Phytologia 55(6):345-360), 6 miles of forest trails, some forest understories, and several other small areas. Picloram is the triisopropanolamine salt of 4-amino-3,5,6-trichloropicolinic acid. It was used as Dow's "Tordon RTU" (meaning Ready To Use, tho we used it half-strength with water), containing 5.4% picloram and 20.9% of a comparable 2, 4-D (the latter added in part for marketing enhancement). Egler abandoned 2,4-D in 1949 as being ineffective in root-killing, in comparison to 2,4,5-T, itself not too effective on many species, and abandoned in 1965.

To test for different seasonal effects, different tracts of land were assigned for the eight months from April thru November (with some spraying elsewhere when possible in the winter months). After four years, no striking monthly differences have yet appeared.

All data in preceding papers (q.v.) require no corrections. Results in 1985 substantiate and extend the findings of recent years. There is still no seasonal difference for the months from April thru November (or in the winter months for the limited tests accomplished). One should be extremely cautious of (1) extra spray landing on the ground (uncontrollable in ordinary hand-held plastic sprayers, obvious when snow is on the ground) and (2) diffusion thru the soil solution,

* The author acknowledges the financial assistance of the Electric Power Research Institute, Palo Alto, Cal. 94303, which assistance allowed the continuation of this longterm project.

or dispersion with the soil water as in spring thaws. Tordon moves "up" (into branches and rhizomes) very readily, but "down" inadequately as with most herbicides. It moves "across" and "around" (radially and circumferentially) also inadequately. Its persistence in the soil may affect a sensitive plant for over four years. In general, keep 10 m. away from desirable plants. Enough other plants (mosses and grasses) are tolerant of picloram so that bare soil and erosion have not occurred so far in these experiments. Physical non-chemical techniques should not be neglected for root-killing experiments. Simple ringing on hemlock and white pine with hatchet or axe is quite effective. Other trees can be ringed. Resprouting usually does occur, and thus should be done only with experience, discretion and judgment: (a) Heavy sprouts can be lopped off the next year, or they may regrow to tree-size. (b) The sprouts will help feed the deer herd, if you have one. (c) If there is a sufficient overhead canopy, the sprouts will not produce enough new leaves and enough photosynthates to keep the roots alive. Such control is only useful in special cases. The wise use of some herbicides is absolutely essential.

In 1982, 45,570 stubs of 97 species were treated. In 1983, 55,667 stubs were treated. In 1984, 39,253. Now in 1985, 24,246 stubs were treated, forming a grand total of 164,736 stubs. Numbers alone are misleading. Some of the plants are clonal, and 50-100% of the ramets are experimentally treated. For non-clonal trees and shrubs, 1-100% of the branches (at varying heights) are treated. Many have variably resprouted, and these are treated 1-3 years later, sometimes with 8-12 resprouts where there had been one stem originally. Treatment was with a 1½ qt. plastic sprayer and pruning shears, for small stems; for larger stems by downward bark-scraping for 6-10 inches with a small folding saw, with discontinuous hatchet-made "cups", or by continuous ringing. It is estimated that one can treat 200 stubs per hour, if the stubs are within 2 feet of each other. Obviously dense thorny barberry or multiflora rose, and distant trail work, greatly increases overall time.

Liquid Picloram

A. In the fields, liquid picloram was again used for stub-spraying a variety of species . (See earlier papers for the names of the 97 species.) The bulk of the spraying is now for Spiraea latifolia, which continues to send up small shoots from rhizomes not yet entirely root-killed. Various other small woody plants are still found, but they are not all to be called personnel "misses". Close observation reveals they are new shoots from old roots,

clinging to life, tho constantly nipped by changing populations of small rodents and deer. This phenomenon is an important factor in understanding natural Vegetation Change, and thus in controlling Vegetation Management.

B. Forest Trails work has increased and 6 miles are now under herbicide control, including Lot Lines (from the 1757 division of Norfolk Township), old charcoal roads (pre-1850), new lumber roads (since 1925), and new narrow connecting foottrails and trails along pre-1850 stone walls. Three species are predominant on all forest trails: Beech (rootsuckers) 95%; Striped Maple (4%); Interrupted Fern (1%). Interrupted Fern produces fronds to waist-height, and are a hindrance to walking. When the fronds are 18" tall, they are grasped as a handful, cut close to the ground with a pruning shears in the other hand; then the stubs completely wetted with picloram. Root-kill is complete. Where Dennstaedtia forms the ground cover, there are no plants to eliminate. Along several hundred feet in young forests, usually close to open areas, there are young trees, but they are not treated unless they reach over deer-browse height.

The Vegetation situation for these trails, and in adjacent forest, is extremely significant to the future lumber industry of Connecticut and of this Vegetation Zone in New England, a situation of which timber foresters seem only dimly aware. Beech sprouts, very low in palatability for deer, grow above the browse line. But the Beech Bark Disease is killing all mature trees. Striped Maple, of no present timber value, survives under deer-browsing, and eventually rises above the browse line. In silvicultural terms there is no new Advance Reproduction of timber trees, of Red Oak, White Ash, Black Cherry, Hemlock (deer-browsed), Red and Sugar Maples, Paper and Yellow Birches, to produce the forest of the future, of 80 years from now, such as all professional foresters proclaim to the private land owners, whose lands they are lumbering. This situation is due directly to the large deer herds, and indirectly to the treeless allelopathic unbrowsed Dennstaedtia ground cover. The situation is already critical in parts of Pennsylvania and New York. In Connecticut it varies in relation to the deer herd. There is a moral obligation for professional state and private foresters, and conservation organizations, to warn the private land owners of this first-time-in-history phenomenon.

Picloram Pellets are used for dense, high or low, many-stemmed shrubs. A few tall shrubs continue to be a problem in the areas delegated for Low Shrubland and Herbland (Mt. Laurel, Winter Holly, Viburnum recognitum (dentatum), Vaccinium corymbosum.

Certain Low Shrubs remain a problem in areas delegated for Herbland (primarily Juniperus communis, Spiraea latifolia (clonal) and Vaccinium angustifolium (clonal). Picloram pellets have been used since 1978, but at the small quantities first used, were ineffective. Increasing quantities on small areas have proved highly efficient for special needs of root-kill.

The methodology used in 1985 involved only small "Spots" (so as not to develop such root-kill of all plants as might initiate critical soil erosion). Pellets were carried in glass screwtop jars, holding 1 2/3 cups. Standing at the edge of an undesired low clonal shrub, one sprinkled the pellets as lightly as possible in a semicircle as far out as one could reach (0.75 m. radius). Spots so treated were flagged with colored tape. Each such semicircle was calculated as 0.9 sq. m. One 10-lb. box of pellets costing $52.50 allowed for the pelleting of slightly over 250 spots. Thus the pellet-cost approximates $0.50/sq.m. Acreage figures are not appropriate for such research. Labor costs are low for such an operation.

In 1985, a total of 630 spots were pellet-treated, mostly Spiraea and Vac. ang. (29 tussocks of Andropogon scoparius were included), with different areas for different months, as with liquid picloram. All spots were separated from each other, so that spread beyond the 0.9-square-meter semicircle could be observed. For large patches, all spots were un the uphill side, so that downslope intra-soil effects would be effective and noticeable. By the end of the season (and in the light of previous treatments in 1981 and 1984) results were highly effective. Kill of juniper beyond the point of application was very obvious, involving areas 3-5 times the semicircle treated. To date, pellet treatment is a recommended procedure for large dense shrubs, provided the dead shrub (often used as bird perches) is a permissable part of the landscape.

Future Herbicide Tests. Herbicidal (and physical) root-kill studies will continue in future years. Liquid picloram use will diminish because of its high effectiveness for the acres and trail-miles involved. Use of picloram pellets will continue. Research with liquid Garlon and Round-up may become prominent.

Stability of the Resulting Vegetation. It should never be overlooked that this species-level herbicidal research is only a root-kill methodology, a kind of Floristic Control, for later study of Plant-Community Stabilities and Instabilities. (Current ecologic literature is unfortunately making "succession" a fashionable term, obviously meaning only physiognomic Vegetation

Change. There is little or no questioning as to how much of the change is due to Relay Floristics, and how much to Initial Floristic Composition, which puts the conceptual approach back to pre-Clementsian days. The differences are of great practical and economic importance).

The first objective of these picloram studies is not to prepare the customary fullsome report of one treatment of picloram on the various species, with data-tabulations one year later and 2 years later, as to percentages of top-kill, partial kill, kill-to-ground, resprouting, etc., notes on subsequent precipitation, soil moisture, etc. If the things appear unaffected, resprout healthily, or are not root-killed 1 or 2 years later, they are treated again. The sole objective is to attain an essentially 100% root-kill on the first spot-treatment. Any thing less is considered a failure, not worthy the taking of quantitative data. Such re-search has occupied me since 1946, but the herbicides themselves (short of soil sterilants) have been inadequate.

The second and major objective of these studies is to produce a variety of Herblands and of Shrublands, devoid of trees and other woody plants. And then (the research that was envisioned in 1931) the objective is to watch for, observe, and experiment with the floristic changes due to other invading species, or with the non-change. It has been obvious for many years that pure Shrublands (natural, or created by man) are in general stable (as in chaparral, macchie, garrigue, fynbosch, et al.), and that Grasslands are lightly invaded by a few trees and shrubs (but not in accord with textbook dogma). Reports of these communities at Aton Forest and elsewhere, are beginning to appear (Niering, W.A. and F.E. Egler, 1955. A shrub community of Viburnum lentago stable for twenty-five years. Ecology 36(2):356-360. Egler, F.E. and John P. Anderson. 1984 Botanical studies in the stability of non-diversity. Taxus canadensis, Yew. 3rd Intern. Symposium on Environmental Concerns in Rights-of way Management. Miss. St. Univ., Miss. 39762. Ditto. 1982. Cornus racemosa, Gray Dogwood. Conn. Bot. Soc. Newsletter 10(3):1 Niering, W.A., G.D. Dreyer, F.E. Egler, J.P. Anderson Jr. 1986. Stability of a Viburnum lentago shrub community after 30 [more] years. Bull. Torrey Bot. Club. 113 (1): 23-27.). Reports on over 100 one-species-predominant Patches, and on various herbland and shrubland Cover Types are in preparation.

End.